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Executive Summary of the Proposed Permit for Arizona Clean Fuels Yuma, LLC

Pursuant to Arizona Administrative Code (A.A.C.) Title 18, Chapter 2 and Arizona Revised Statues, Title 49, Chapter 3, the Arizona Department of Environmental Quality (ADEQ) is proposing to issue a Class I Prevention of Significant Deterioration (PSD) air quality permit to Arizona Clean Fuels Yuma, LLC.

INTRODUCTION

ADEQ is proposing to issue a Class I / Title V Permit No. 1001205, subject to the public comment period, for the proposed Arizona Clean Fuels (ACF) petroleum refinery, a major stationary source of air pollution. The proposed refinery will be located on an approximately 1,450-acre site, 40 miles east of Yuma, near the Community of Tacna, in Yuma County. The proposed refinery will have a crude oil atmospheric distillation capacity of approximately 150,000 barrels per day (BPD). It is expected to produce approximately 150,000 BPD of motor fuels, including approximately 85,000 BPD of motor gasoline; 35,000 BPD of diesel fuel; and 30,000 BPD of jet fuel. In addition to motor fuels, the refinery will produce liquefied petroleum gas (LPG), sulfur, and petroleum coke.

The site of the proposed refinery is located in a "clean air area" – one that has been designated as attainment or unclassifiable for all criteria pollutants under the Clean Air Act. The criteria pollutants are particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur oxides (SO_x), carbon monoxide (CO), lead (Pb), and ozone (O_3).

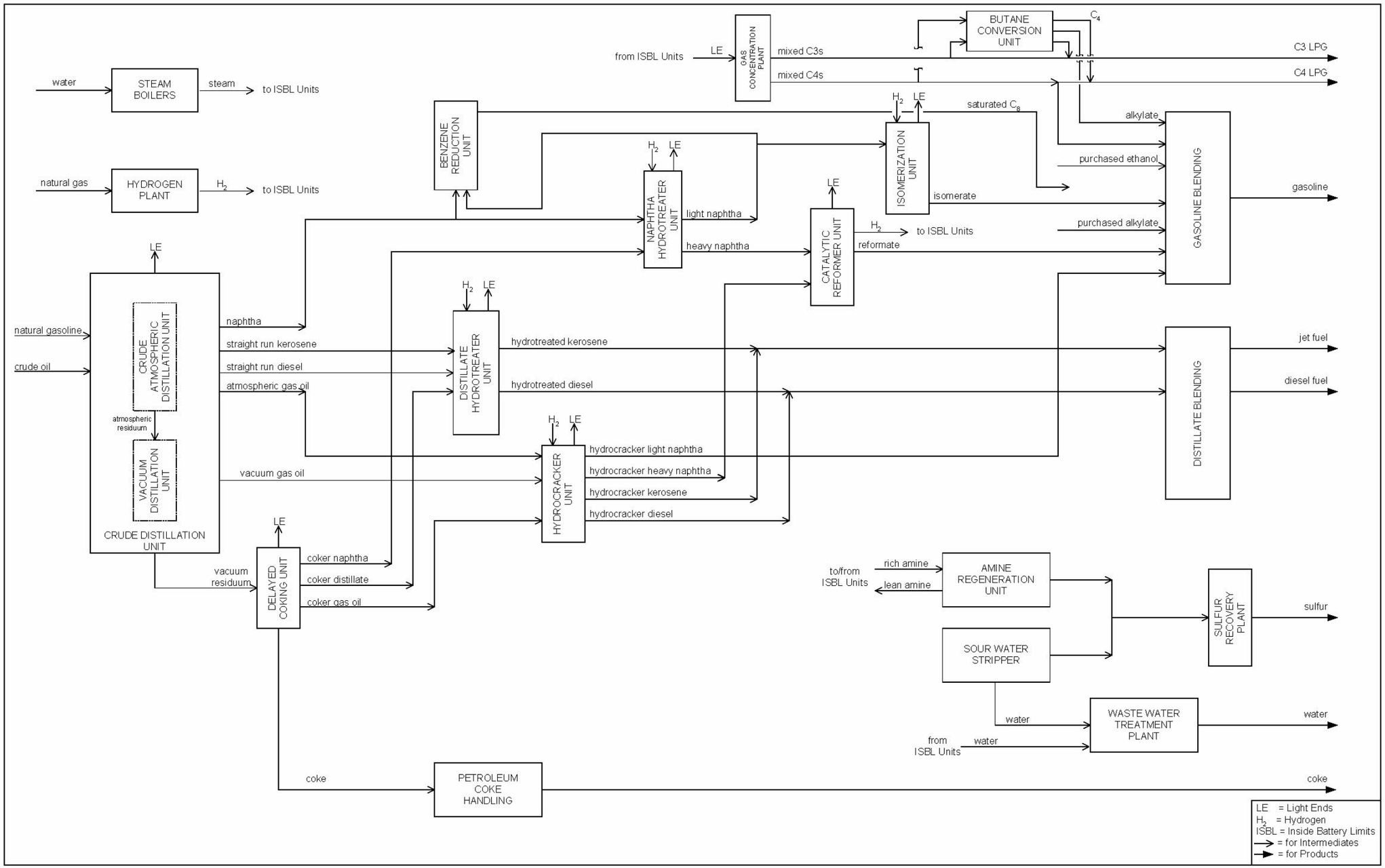
The design of the proposed refinery incorporates state-of-the-art technologies for reducing air emissions. Per unit of product, the allowable emissions from the proposed Arizona Clean Fuels refinery would be significantly less than the actual emissions from any other existing petroleum refinery.

If constructed, this project would represent the first new petroleum refinery constructed in the U.S. in more than 30 years and the first facility in the western U.S. to be built specifically for the production of newer clean fuels. It would be the only petroleum refinery in Arizona, and the only large refinery between Texas and California. Several specialized commercial technologies are to be incorporated in the refinery process units to reduce fuel aromatics and sulfur, which in turn reduces emissions from vehicles.

PROCESS DESCRIPTION

An overview of the refinery's processes is presented schematically on the following page.

FIGURE II-A. SIMPLIFIED REFINERY PROCESS FLOW DIAGRAM



The proposed petroleum refinery would operate 24 hours a day and 365 days a year. Primary raw materials for the refinery are crude oil and natural gasoline. These materials would be delivered to the refinery primarily via a pipeline. Other raw materials include butane, propane, alkylate, and oxygenates, which would be delivered to the refinery via rail, and natural gas, which would be received by pipeline.

Motor fuels would be shipped from the refinery by pipeline, rail, and truck. In addition to motor fuels, the refinery would produce liquefied petroleum gas (LPG), sulfur, and petroleum coke, all of which would be shipped by rail.

The proposed petroleum refinery's major process units would include a Crude Distillation Unit, a Delayed Coking Unit, a Hydrocracker Unit, a Naphtha Hydrotreater Unit, a Distillate Hydrotreater Unit, a Catalytic Reforming Unit, a Butane Conversion Unit, a Benzene Reduction Unit, and an Isomerization Unit. Supporting process units would include a Gas Concentration Plant, a Hydrogen Plant, a Sulfur Recovery Plant, an Amine Regeneration Unit, a Sour Water Stripper, and a Wastewater Treatment Plant. Ancillary equipment would include storage tanks, loading and unloading racks, emergency flares, steam boilers, a cooling tower, an emergency generator, and two emergency fire water pumps.

AMBIENT AIR QUALITY IMPACTS

The site of the proposed refinery is located in a "clean air area" – one that has been designated as attainment or unclassifiable for all criteria pollutants under the Clean Air Act.

As part of the permit application review process, the Department performed a detailed review of the Ambient Air Quality Impact Analysis performed by the applicant, including confirmatory dispersion modeling. Based on the result of this review, the Department has concluded that the proposed refinery will not cause or contribute to an exceedance of any National Ambient Air Quality Standard (NAAQS), PSD Increment, or Arizona Ambient Air Quality Guideline (AAAQG) level. Specifically, the analysis shows the following:

- The maximum predicted ambient concentration of PM_{10} is less than 64 percent of the annual NAAQS and less than 54 percent of the 24-hour NAAQS. Each of these values includes all existing sources and background concentration; the refinery's modeled impact represents less than 4 percent of the predicted annual average concentration and less than 15 percent of the predicted 24-hour average concentration.
- The maximum predicted ambient concentration of SO_2, including all existing sources and background concentration, is less than 15 percent of the NAAQS for each of the three averaging periods (3-hr, 24-hr, and annual). The refinery's modeled impact represents less than 10 percent of the NAAQS for each of the three averaging periods.
- The modeled impact of the refinery on ambient NO_X concentration is less than 1 percent of the NAAQS.
- The modeled impact of the refinery on ambient CO concentration is less than 2 percent of the NAAQS.
- The modeled impact of the refinery is less than all applicable PSD increments.
- The modeled impact of the refinery on ambient concentration of state air toxics is less than ten percent of the AAAQG for 34 of the 46 hazardous air pollutants expected to be emitted by the plant. For the remaining 12 pollutants, ambient impacts were mitigated to the maximum possible extent and were deemed to meet requirements. These pollutants, and the ambient impact as a percentage of the AAAQG, are as follows:

Benzene (93%)	Mercury (20%)
Chlorine (74%)	Cadmium (18%)
H_2S (47%)	Aluminum (16%)
Silver (44%)	Lead (15%)
Formaldehyde (28%)	Phenol (13%)
Selenium (28%)	Ammonia (11%)

AIR POLLUTANT EMISSIONS

The total allowable emissions of criteria pollutants from the proposed Arizona Clean Fuels refinery are shown in Table 1.

Table 1. Allowable Emissions (tons/year)

NO_X	SO_2	VOC	PM_{10}	CO
396	251	251	176	817

For the four criteria pollutants of primary concern (NO_X, SO_2, VOC, and PM_{10}), emission contributions from various sources within the refinery are illustrated graphically in Figure 1. As shown in Figure 2, the allowable emissions under the proposed permit are considerably lower than those requested in the initial permit application received by the Department. This is a result of the Department's "Best Available Control Technology" review, which is discussed in greater detail below.

The proposed air quality permit would ensure that the Arizona Clean Fuels refinery would be, by a considerable margin, the lowest-emitting petroleum refinery in the U.S. Per unit of product, the allowable emissions from the proposed refinery would be significantly less than the actual emissions from any other existing petroleum refinery and would be less than one-twentieth the emissions from some older (but still operating) refineries. This is illustrated graphically in Figure 3, using the refineries of Los Angeles County, California, for comparison. The refineries in Los Angeles County are generally considered to be the lowest-emitting of all existing petroleum refineries.

APPLICABLE AIR QUALITY REGULATIONS

The proposed permit includes emission limits and standards and compliance demonstration requirements from numerous federal and state air quality regulations. The most important of these is the Prevention of Significant Deterioration (PSD) rule under Article 4 of A.A.C. Title 18, Chapter 2. This rule requires that an ambient air quality impacts analysis be performed and also requires that the proposed new refinery implement "Best Available Control Technology," or "BACT." The results of the ambient air quality impacts analysis are summarized above, under the heading "Ambient Air Quality Impacts." The BACT requirements in the proposed permit are discussed in greater detail below, under the heading "Best Available Control Technology."

Figure 1. Arizona Clean Fuels Emissions Breakdown (Total NO_X, SO_2, PM_{10}, VOC by Source Type)

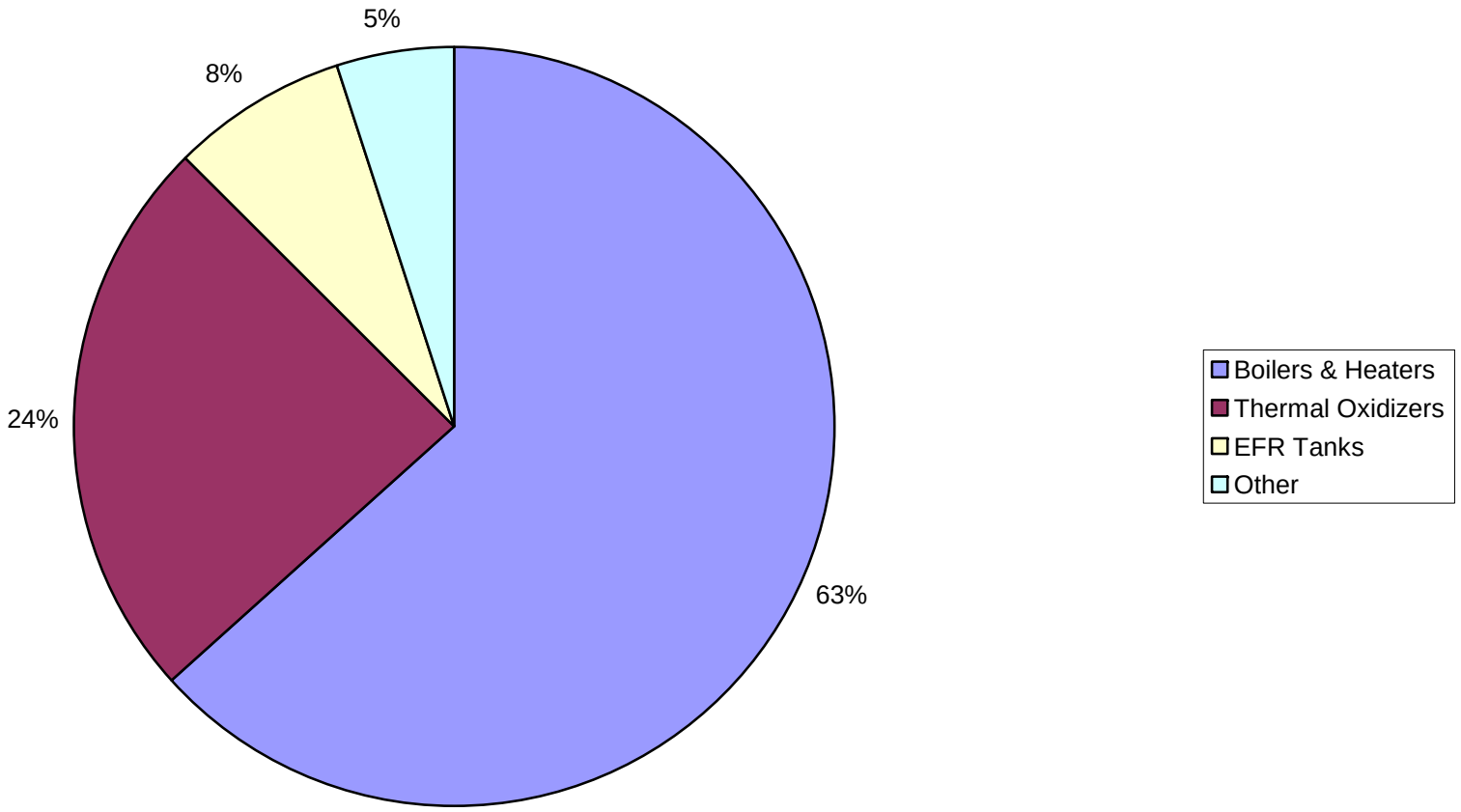


Figure 2. Arizona Clean Fuels Emissions
(Proposed Permit vs. Initial Permit Application)

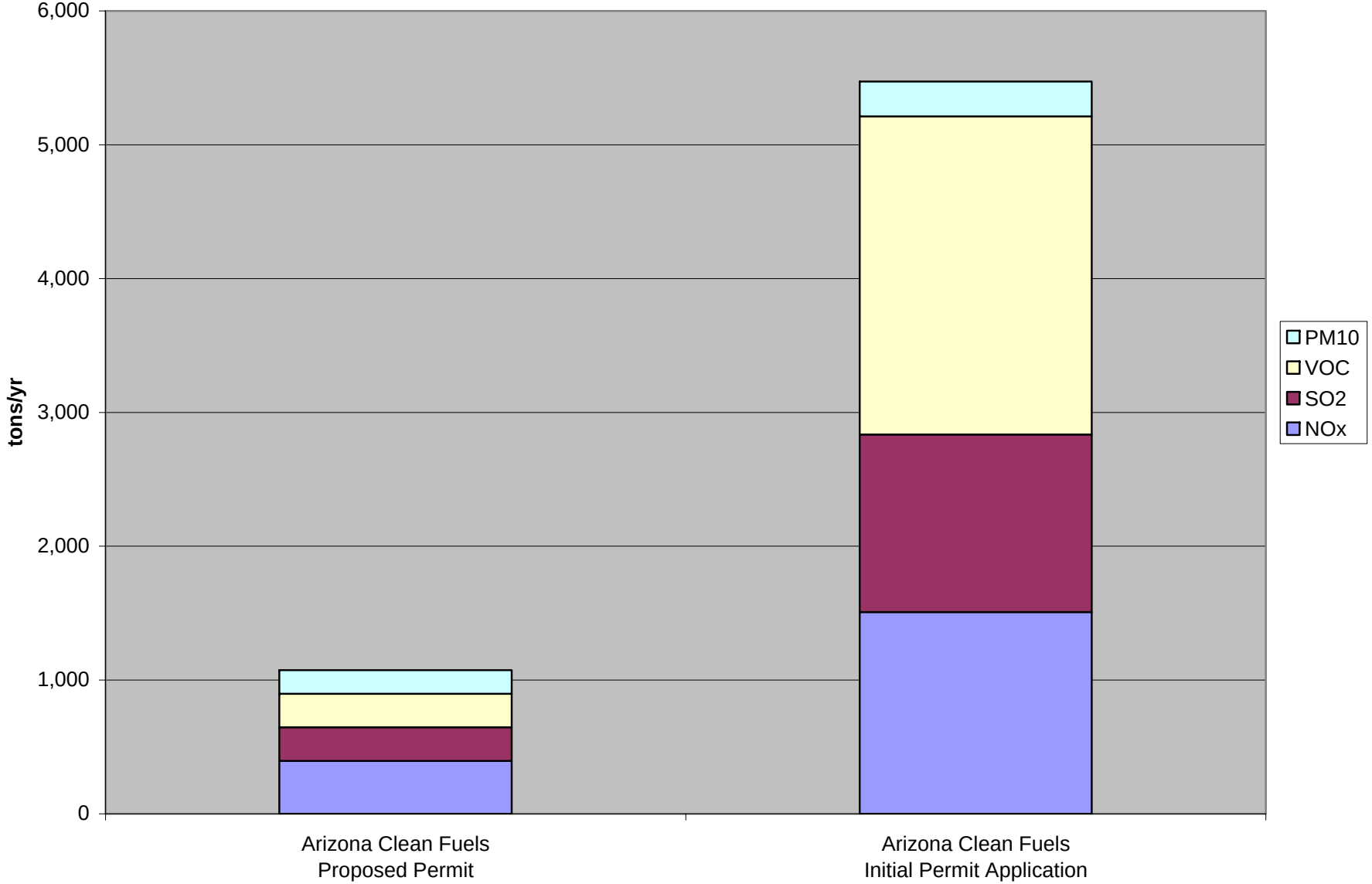
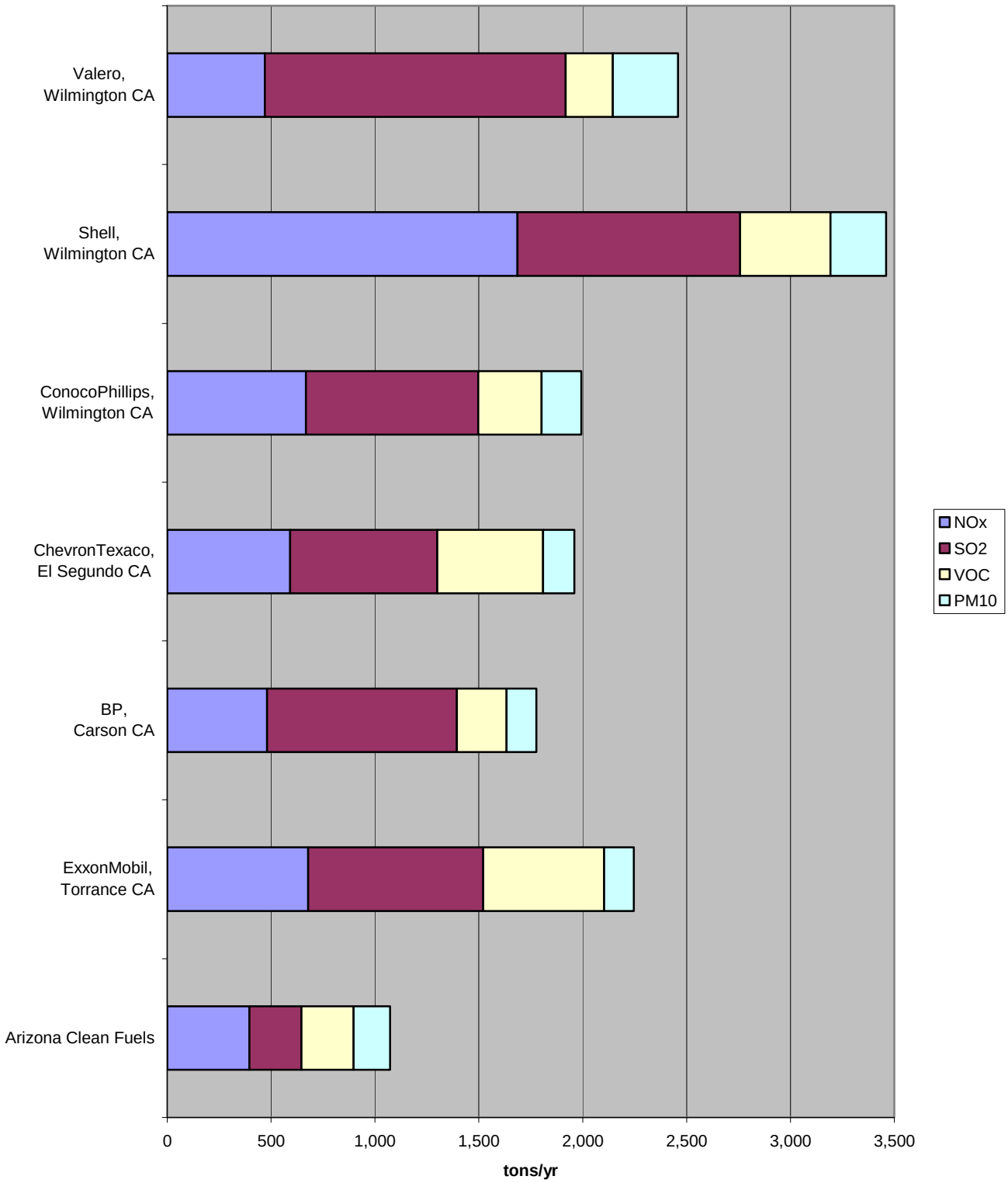


Figure 3. Refinery Emissions (Arizona Clean Fuels and Los Angeles County Refineries)
Arizona Clean Fuels allowable; others 2002 actual emissions normalized to 150,000 BPD



Other applicable federal and state regulations that are reflected in the stringent requirements of the proposed air quality permit include the following:

- Nine New Source Performance Standards (NSPS) under 40 CFR part 60:
  - Subpart Db, Industrial-Commercial-Institutional Steam Generating Units
  - Subpart J, Petroleum Refineries
  - Subpart Kb, Volatile Organic Liquid Storage Vessels
  - Subpart UU, Asphalt Processing
  - Subpart XX, Bulk Gasoline Terminals
  - Subpart GGG, Equipment Leaks of VOC at Petroleum Refineries
  - Subpart NNN, Synthetic Organic Chemical Distillation Operations
  - Subpart QQQ, Petroleum Refinery Wastewater Systems
  - Subpart RRR, Synthetic Organic Chemical Reactor Processes

- One National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR part 61:
  - Subpart FF, Benzene Waste Operations

- Four Maximum Achievable Control Technology NESHAP rules under 40 CFR part 63:
  - Subpart CC, Petroleum Refineries
  - Subpart UUU, Petroleum Refinery Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units
  - Subpart ZZZZ, Stationary Reciprocating Internal Combustion Engines
  - Subpart DDDDD, Industrial Boilers and Process Heaters

- Compliance Assurance Monitoring under 40 CFR part 64.

- Standards for nonpoint sources under Article 6 of A.A.C. Title 18, Chapter 2:
  - A.A.C. R18-2-602, Open Burning
  - A.A.C. R18-2-604, Open Areas, Dry Washes, and Riverbeds
  - A.A.C. R18-2-605, Roadways and Streets
  - A.A.C. R18-2-606, Material Handling
  - A.A.C. R18-2-607, Storage Piles
  - A.A.C. R18-2-612, Opacity of Emissions from Nonpoint Sources

- Standards for stationary sources under Article 7 of A.A.C. Title 18, Chapter 2:
  - A.A.C. R18-2-702, General Provisions for Point Sources
  - A.A.C. R18-2-719, Stationary Rotating Machinery
  - A.A.C. R18-2-726, Sandblasting Operations
  - A.A.C. R18-2-727, Spray Painting Operations
  - A.A.C. R18-2-730, Unclassified Sources

- Standards for mobile sources under Article 8 of A.A.C. Title 18, Chapter 2:
  - A.A.C. R18-2-801, General Provisions for Mobile Sources
  - A.A.C. R18-2-802, Off-Road Machinery
  - A.A.C. R18-2-804, Roadway and Site-Cleaning Machinery

BEST AVAILABLE CONTROL TECHNOLOGY(BACT)

As required by the PSD rule under Article 4 of A.A.C. Title 18, Chapter 2, the Department made determinations of BACT for each emission unit at the refinery and for each pollutant emitted. The process used by the Department in making its BACT determinations starts with a review of the control measures used by other similar sources, including other petroleum refineries nationwide. The Department then establishes emission limits based on the maximum achievable degree of emission reduction, taking into account technical feasibility, environmental impacts, economic impacts, energy impacts, and other costs. In the case of the Arizona Clean Fuels refinery, the Department's BACT determinations would ensure that this would be, by far, the lowest-emitting, fully integrated petroleum refinery in the U.S.

The proposed air quality permit includes requirements for numerous, state-of-the-art emission control measures that are exceptionally stringent relative to the air quality permits for most petroleum refineries. Examples of these measures include the following:

- The refinery design does not include a fluidized catalytic cracking unit, and the permit does not allow the construction of such unit. Nearly all other petroleum refineries include a fluidized catalytic cracking unit, and this unit is generally the largest-emitting unit at a refinery. The Arizona Clean Fuels petroleum refinery would accomplish the same refining objectives using other technologies, most notably a Hydrocracker Unit.
- The refinery design does not include any alkylation processes that require the use of hydrofluoric acid or sulfuric acid as catalysts, and the permit does not allow the construction of such processes. Most other petroleum refineries include these types of alkylation processes, which are potential sources of toxic chemical releases. The Arizona Clean Fuels petroleum refinery would accomplish the same refining objectives using other technologies, most notably the Butane Conversion Unit.
- The permit prohibits the use of flares as pollution control devices for intermittent or routine, non-emergency hydrocarbon releases. Most other petroleum refineries do currently use elevated flares for this purpose. This commonly results in visible exposed flames, excessive VOC and CO emissions, and difficulty in monitoring and tracking air pollutant emissions. As with all petroleum refineries, the Arizona Clean Fuels refinery would include flares for the safe disposal of gases released during emergencies.
- The permit prohibits the combustion of fuel oil in the refinery's boilers and heaters. Natural gas and fuel gases generated within the refinery are the only fuels allowed. Most petroleum refineries do burn fuel oil, which results in higher emissions of several air pollutants.
- The permit requires highly efficient removal of sulfur from fuel gas burned in the refinery's process heaters, so that the sulfur concentration is maintained at or below 35 parts per million by volume. This would be nearly 80 percent lower than the applicable emission standards for most other petroleum refineries, and the Department is not aware of any other petroleum refinery that is required to achieve a limit that is this stringent.
- The permit requires the use of ultra-low-NO_X-burners (ULNB) for control of NO_X emissions from <u>all</u> boilers and heaters. Nearly all petroleum refineries have at least some boilers and heaters that are not so equipped.
- The permit requires the use of selective catalytic reduction (SCR), in addition to ULNB, for control of nearly three-fourths of the residual NO_X emissions. In other words, SCR is required for process heaters that comprise nearly three-fourths of the refinery's total heat input capacity. Most refineries are not required to employ SCR systems for NO_X control on <u>any</u> boilers or process heaters.
- The permit limits ammonia emissions from the SCR-equipped process heaters to a maximum

concentration of 5 parts per million by volume. The Department is not aware of any other petroleum refinery or similar facility that is required to achieve a limit that is more stringent.

- The permit requires highly efficient recovery of sulfur from refinery waste streams, with a design efficiency level of more than 99.97 percent and an SO_2 emission limit of only 33.6 pounds per hour. The Department is not aware of any other petroleum refinery that is required to achieve a limit that is this stringent.
- The permit requires the refinery to meet several equipment design standards and work practice requirements in order to minimize SO_2 emissions during upsets and malfunctions of the sulfur recovery process. These measures include a requirement to curtail operations and to divert sulfur-containing streams in order to eliminate excess emissions within 15 minutes after the beginning of a process upset, and requirements for excess capacity sufficient to allow the refinery to operate for at least 24 hours during such an upset without further excess emissions. The Department considers this to be an important element of the refinery's design and a focus of the BACT analysis because, in the absence of such measures, the refinery could emit SO_2 at a rate approaching 75 tons per hour during upsets and malfunctions. (This is more than 4,000 times the maximum allowable SO_2 emission rate of 33.6 pounds per hour during normal operations.) The Department is not aware of any other petroleum refinery that is required to meet requirements that are this stringent.
- The permit requires the use of gas compression for recovery and in-process recycling of hydrocarbon vapors from selected hydrocarbon liquid storage tanks. This configuration would result in near-zero emission rates for the affected tanks. The Department is not aware of any other petroleum refinery that is required to employ this equipment configuration.
- The permit requires the use of floating roofs in tandem with a thermal oxidizer for control of VOC emissions from other selected storage tanks. This configuration would result in near-zero emission rates for the affected tanks. The Department is not aware of any other petroleum refinery that is required to employ this equipment configuration.
- The permit requires the use of thermal oxidizers for control of VOC emissions from each vessel within the refinery's Wastewater Treatment Plant. The permit requires that this thermal oxidizer be designed for at least 99.9 percent VOC destruction efficiency, and also requires that a minimum operating temperature and residence time be maintained continuously in order to ensure the maximum feasible degree of VOC destruction at all times. The Department is not aware of any other petroleum refinery or similar facility that is required to achieve such a high level of VOC emission reduction.
- The permit requires the use of carbon adsorption systems for control of VOC emissions from all drains and sumps within the refinery's wastewater collection system. The permit also requires that each system include two carbon canisters in series in order to ensure the maximum feasible degree of VOC reduction at all times. The Department is not aware of any other petroleum refinery or similar facility that is required to achieve a higher level of VOC emission reduction.
- The permit requires the use of vapor recovery in tandem with thermal oxidizers for control of VOC emissions from gasoline loading into tank trucks and rail cars. This would result in 99.99 percent control of VOC emissions. The Department is not aware of any other petroleum refinery or similar facility that is required to achieve as high a level of VOC emission control.
- The permit requires the use of thermal oxidizers for control of VOC emissions from loading of diesel fuel and aviation jet fuel into tank trucks and rail cars. The permit requires each of these thermal oxidizers be designed for at least 99.9 percent VOC destruction efficiency, and also requires that a minimum operating temperature and residence time be maintained continuously in order to ensure the maximum feasible degree of VOC destruction at all times. The Department is not aware of any other petroleum refinery or similar facility that is required to employ this equipment configuration or to achieve such a high level of VOC emission reduction.

- The permit requires the use of low-NO_X burners to minimize emissions of NO_X from thermal oxidizers used to control VOC emissions, this equipment is state of the art and used in California refineries.
- The permit requires that the refinery implement a thorough and stringent program for preventing VOC emissions by monitoring, detecting, and repairing leaks in equipment such as valves and pumps. More than 60,000 components (individual pieces of equipment) will be subject to these requirements. Although nearly all petroleum refineries are required to implement "Leak Detection and Repair" or "LDAR" programs under federal regulations, the program required by the proposed permit exceeds the requirements of other programs in a variety of ways:
  - More extensive LDAR program applicability: The proposed permit includes LDAR program requirements for flanges and screwed connectors, which represent nearly half of the total number of affected components. The LDAR program requirements at most refineries do not extend to this type of equipment.
  - Lower leak levels: Under the proposed permit, equipment is deemed to be leaking if the measured concentration exceeds 100 parts per million by volume (ppmv) for some types of components and 500 ppmv for all other types. The LDAR program requirements for most refineries do not consider equipment to be leaking until the concentration is 10,000 ppmv, which is 20 to 100 times as high as the limit in the proposed permit.
  - Faster repair requirements: Under the proposed permit, a first attempt at repair is required within 24 hours, and successful repair is generally required within 7 days. The LDAR programs at most refineries only require that a first attempt at repair be made within 5 days and that successful repair be completed within 15 days.
  - Limits on the number of leaking components: Under the proposed permit, repair could be delayed beyond the 7-day period that is generally required, but only to the extent that the number of leaking components is less than a very small percentage of similar components refinery-wide. The LDAR programs at most refineries do not include any such restrictions.
  - More frequent monitoring: The proposed permit requires frequent monitoring of all types of components, regardless of refinery's past achievements with regard to the percentage of leaking components. For example, the proposed permit requires quarterly monitoring of valves, whereas the LDAR programs at most refineries would require only annual monitoring.
- The permit requires that the refinery implement a thorough and stringent program for preventing VOC emissions by monitoring, detecting, and repairing leaks in the refinery's cooling water system. The permit specifies continuous monitoring of all cooling water streams at the Arizona Clean Fuels refinery. The Department is not aware of any other petroleum refinery or similar facility that is required to implement a program for minimizing VOC emissions from cooling towers that is this stringent. Most petroleum refineries are not required to implement any type of LDAR program for the cooling water system, and the few that are generally are require to perform sampling only four times per year. This potentially allows for tremendous quantities of VOC to be emitted from the cooling towers without detection.
- The permit restricts the emergency generator and the emergency fire water pumps to burning only ultra-low-sulfur Diesel fuel in order to minimize SO_2 emissions. The Department is not aware of any other petroleum refinery that is required to comply with a restriction that is this stringent.
- The permit requires that the emergency generator and the emergency fire water pumps be designed and equipped with combustion modifications to minimize emissions of NO_X, CO, and PM_{10}. The emission limits in the proposed permit are much more stringent than those imposed on any similar facility.

COMPLIANCE DEMONSTRATION REQUIREMENTS

The proposed permit includes exceptionally stringent testing, monitoring, recordkeeping, and reporting requirements that would be adequate to provide assurance of continuous compliance with all emission limits and standards. These requirements include installing and using 50 continuous emission monitoring systems (CEMS); conducting at least 69 annual emission tests (including performance tests and CEMS accuracy tests); monitoring and recording 133 different process and control device operating parameters; and reporting of the results of all required testing and monitoring. The sampling, analysis, and recordkeeping requirements associated with hydrocarbon releases to the emergency flares, in particular, would be more stringent than what is typically required of other petroleum refineries.

REQUEST FOR PUBLIC COMMENT

A Public Notice will be published in the Arizona Republic on September 14, 2004, and on September 21, 2004. Additional notices will be published in the Yuma Daily Sun and the Bajo El Sol (Yuma) newspapers on September 17, 2004, and September 24, 2004. A public meeting and a public hearing will be held in each of the following cities: Wellton, Yuma, and Phoenix. During the public meetings, citizens will have the opportunity to hear a presentation and ask questions about the proposed permit. During the public comment period, and at the meetings and hearings, citizens are entitled to express any concerns that are relevant to the proposed permit. The public comment period will officially close on November 29, 2004. Therefore, all comments must be postmarked or hand-delivered no later than November 29, 2004.

Additional information on the public notice, and copies of the proposed permit and technical support document, can be obtained from the ADEQ website at www.azdeq.gov/environ/air/permits/acf.html.

We encourage you to be informed and involved in ADEQ activities. We need your involvement to help us protect our environment and public health. For more information, please contact Mr. Eric Massey, Manager of the Air Quality Permits Section, at (800) 234-5677, extension 771-2288, or (602) 771-2288. You may also contact Mr. Trevor Baggiore, Manager of the New Source Review Unit of the Air Quality Permits Section, at (800) 234-5677, extension 771-2321, or (602) 771-2321.